ABSTRACT

Globally cancer is a disease which severely effects the human population. There is a constant demand for new therapies to treat and prevent this life threatening disease. Scientific and research interest is drawing its attention towards naturally derived compounds as they are considered to have less toxic side effects compared to current treatments such as chemo therapy. The plant kingdom produces naturally occurring secondary metabolites which are being investigated for their anti cancer activities leading to the development of new clinical drugs. New technologies including nano-particles for nano-medicines which aim to enhance anticancer activities of plant derived drugs by controlling the release of the compound and investigating new methods for administration. This review lists out the various naturally derived compounds from medicinal plants, their active constituents and their properties along with the mechanism of action of the compounds.

Key Words: Cancer, clinical, nanoparticles, plants, active constituents

INTRODUCTION

Cancer has been a constant battle globally with a lot of development in cures and preventive therapies. This disease is characterized by cells in the human body continually multiplying with the inability to be controlled or stopped. Consequently, the formation of tumors of malignant cells occurs.

Causes:-
1. Environmental factors:-
Use of tobacco causes lung cancer
Diet and obesity
Infections
Radiation (prolonged exposure to UV rays causes skin malignancies).
Stress
Lack of physical activities
Pollution (prolonged exposure to asbestos).

2. Genetic factors:-
Approximately 5-10% cancers are due to the inherited genetic defects from a person’s parents.
Prevention of cancer:-
Limit the tobacco use
Proper diet
Proper physical activity
Protection from sun light
Get regular medical care.

Treatment
Treatments such as chemotherapy can put patients under a lot of strain and further damage their health. Therefore there is a focus on using alternative treatments and therapies against cancer. For many years herbal medicines have been used and are still used in developing countries as the primary source of treatment. Plants have been used in medicines for their natural anti septic properties. Thus research is being done to investigate the potential properties and uses of terrestrial plants for the preparation of drugs for curing cancer. Many plant species are already being used to treat or prevent the development of cancer. Some of such plants, their properties and constituents along with their mechanism of action are listed in this review.

Herbal drugs used for the treatment of cancer:-
ASTRAGALUS (Huang Qi):

A Chinese herb; an immune system booster, known to stimulate body’s natural production of interferon. It also helps the immune system identify rogue cells and boosts the T-cell levels. Work with the herb in both cancer and AIDS cases has been encouraging.

BERBERIS FAMILY (e.g. Podophyllum peltanum):

Slow active purgative. Research has shown these herbs to have a strong action against cancer and they have been used with many cancers, especially ovarian cancer. An ingredient Berberine, was shown in research to
outperform brain cancer drug, Temozolomide in vitro. It was also shown to act synergistically with it and improve its efficacy.

**BLOODROOT (Sanguinaria canadensis):**

Research shows consistent anti-neoplastic activity. The main active ingredient is Sanguinarine, which has shown to be effective against cancer tumours, and can shrink them; it is one of the herbs in an anti-cancer poultice called Black Salve against breast and skin cancers; and has proven useful with sarcomas.

**BUTCHERS BROOM (Ruscus aculeatus):**

The active ingredients of this herb has been found to be the ruscogenins which have tumour-shrinking and anti-oestrogenic abilities. Thus its use in the treatment of breast cancer.

**CAT’S CLAW (Uncaria tormentosa):**
An adaptogen and powerful immuno-stimulant, it enhances the white cells clean up process (phagocytosis). Research indicates it can reduce tumour size, particularly with skin cancers due to the presence of Oxindole alkaloids. It also helps reduce the side-effects of chemo and radiotherapy.

**CHAPARRAL (Larreamexicana):**

It appears to boost the immune system, stop metastases and reduce tumour size, due to the presence of Nordihydroguaiaretic acid, it helps in treatment of breast cancer. It is also an anti-oxidant and anti-microbial, with low toxicity.

**CURCUMIN (Turmeric):**

This spice (Curcuma longa or Turmeric root) has been shown to have significant anti-microbial and anti-inflammatory activity. It is used in the treatment of polyps and colon cancer. It can both shrink cancer tumours and inhibit blood supply growth to tumours. It is a powerful antioxidant with liver protective benefits, and outperformed several anti-inflammatory drugs without side-effects.

**DANG SHEN ROOT (Codonopsispilosula):**
Increases both the white blood cell and red blood cell levels, so can be extremely helpful to patients having chemotherapy and radiotherapy, or to patients whose cancer diminishes levels of either. The main active ingredients are Codonopsine and codonolactone.

**ECHINACEA:**

It is a known immune system booster, helpful in treatment of brain tumours apart from its abilities to increase the levels of certain immune white cells in the body.

**FEVERFEW:**

It is found to be more effective than the drug cytarabine in killing leukaemia cells, due to the presence of parthenolide.

**GOLDENSEAL:**
One cause of stomach cancer can be the bacterium *Helicobacter pylori*. This burrows into the mucous lining of the stomach to hide from gastric acids, and then causes irritation, acid reflux, ulcers and even cancer. Goldenseal is generally anti-microbial and is used for the treatment of cancer and has an important constituent berberine. It lowers the risk of developing certain types of cancer.

**MILK THISTLE:**

![Milk Thistle](image)

Known for years to be helpful in strengthening the liver, this herb has now been shown to be capable of protecting the liver during chemotherapy due to the presence of silibinin.

**PAU D’ARCO:**

![Pau d'Arco](image)

This tree bark was original thought to be a strong anti-cancer agent, but then its actions were clarified as strongly anti-bacterial, anti-yeast and anti-microbial. That alone might be enough in some cases of cancer cause. The quinoids possess immune strengthening abilities and seem to help in cases of blood and lymph cancers.

**RED CLOVER:**
It has a potential as a part of a treatment programme against oestrogen-driven cancers, from breast to prostate. One active ingredient in the so-called Herb of Hippocrates is the anti-oestrogen Genistein.

SHEEP’S SORREL:

Used in Essiac and other herbal remedies, it is a cleanser and aids healthy tissue regeneration. There is some suggestion from research that it helps normalise damaged cells and tissue due to the presence of carotenoids. It is also a highly praised ‘vermifuge’ - intestinal worms have little or no resistance to this herb.

SKULLCAP (Scutellariabarbata):

Research has shown action against many cancer types, for example against cancers of the lung, stomach and intestines due to the presence of beta-elemene.

SUTHERLANDIA (Cancer Bush):
This herb is anti-inflammatory, anti-viral and anti-fungal. It boosts the immune system and inhibits Tumour Necrosis Factor, known to drive wasting in cancer patients.

**THOROWAX, or HARES EAR (Bupleurumscorzonefolium):**

Research has shown its ability to enhance the production of natural interferon and it seems especially useful in bone cancer.

**WHEATGRASS:**

It acts as a blood purifier, and liver and kidney cleansing agent. In research, after two weeks of daily use, blood and tissue oxygen levels improve, as does circulation.
SWEET WORMWOOD:

It is strongly anti-microbial and anti-yeast and can be used as an effective part of an anti-candida diet. Also certain cancer treatments cause excesses of yeasts to form (for example, in Leukemia treatment) threatening the patients’ health further.

BURDOCK ROOT:

It is very effective at removing the cancer causing toxins that accumulate in our digestive systems when certain foods are not properly digested. There are several anti-cancer herbal compounds that have used burdock root as a base including “Flor-Essence,” and “Essiac.”

GRAPE SEED:
It is known that the phytochemicals in grape seeds have anti-tumor or strong potential cancer preventative abilities that can be isolated from the seeds themselves. Proanthocyanidins are especially worth noting, as these have been found to stop pancreatic cancer cells from spreading or migrating.

**GINGER ROOT:**

Gingerol, the active ingredient in ginger root, has gotten a great deal of attention, especially in clinical trials, in an attempt to determine its potential to stop or prevent certain cancers. Results from these pharmacological experiments show that ginger might inhibit the growth of tumors in human beings. In cases of ovarian cancer, researchers found that gingerol caused cancer cell death, reduced inflammation, and improved immune function.

**ALOE VERA:**

Aloe vera has been around for centuries, with the earliest known references to its medicinal use being from the ancient Egyptians, who also used it for skin problems. Aloe vera contains a compound called 1,8 dihydroxy-3 (hydroxymethyl) – anthraquinone (AE for short) which has been proven to cause cell death amount human bladder cancer cells. AE has impressive anticancer effects. It stops cell viability as well as stopping the G2/M of the cell lifecycle.
CLOVE:

Clove oil from cloves (Eugenia aromaticum or Eugenia caryophyllata) has been studied for their ability to improve immune function, which means it offers cancer protection or prevention. Its high antioxidant levels show that it is a powerful supplier of anthocyanins, which are known to stop the growth of tumors, as well as kill existing cancer cells.

LIQUORICE ROOT:

Licorice root also contain polyphenols that encourage apoptosis (automatic death) in cancer cells. Licorice regulates the production of hormones from your adrenal glands, and it reduces stress chemicals. Chronic stress often triggers the growth of cancer cells. Licorice root stops the proliferation of breast cancer cells in humans.

TEA:
Considered by many cultures to have healing and preventative compounds, including against cancer, tea (Camellia sinensis) has been the focus of several scientific studies recently. All varieties of tea, including green white, black, and oolong, were found to contain high levels of antioxidants, which are powerful anti-aging and anti-tumor agents.

**ONION:**

Onion (Allium cepa) has a high antioxidant activity and is associated with a variety of pharmacological items including being anti-inflammatory, antibiotic, and anti-carcinogenic. The onions lowered the risk of colorectal cancer, ovarian cancer, renal cell cancer, prostate cancer, esophageal cancer, mouth cancer, and breast cancer.

**DANDELION:**

It can inhibit the development and growth of numerous types of cancer, including stopping their metastasizing capabilities. The leaf of this common weed blocked the growth of breast cancer cells and the invasions of prostate cancer cells.

**FOX GLOVE:**
There have been several studies done regarding foxglove and its possible anti-cancer capabilities. There are two varieties of this plant, Digitalis purpurea L. and Digitalis lanataehrh. Acteoside, which can be extracted from the leaves of this common flower, have a hepatoprotective effect from a toxin called aflatoxin B1. This makes this plant cytotoxic and a strong potential chemo-preventative possibility.

GRAVIOLA:

A natural anti-cancer agent, Graviola (Annonamuricata) is an evergreen tree that is used as a remedy for coughs, bacterial and parasite infections, herpes, and arthritis. By inhibiting several signaling pathways that pancreatic cancer cells use to regulate their survival and metastatic lifecycle, graviola kills these cells when they are unable to complete their normal function.

MISTLETOE:

The extracts from mistletoe (viscum album) and the products that come from this extract, especially iscador, is one of the most commonly used oncology. It’s been used as an overall treatment for cancer for years.

SAFFRON:
Saffron contains a carotenoid compound called crocetin. Studies done, both in vivo and in vitro, show that this compound has the potential to be a strong anti-tumor agent. Saffron was found in another study to inhibit skin cancer in mice.

CONCLUSION

In this review is listed out the various naturally derived compounds from medicinal plants active in the treatment of cancer. It will be useful for research scholars for doing the future work.

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